

What is claimed is:

1. A rosin-fatty acid vinylic polyamide polymer resin composition comprising the reaction product prepared by:

(A) reacting in an addition polymerization reaction:

(1) about 20.0% to about 60.0% by total weight of the reactants of a fatty acid rosin mixture comprising:

(a) about 10.0% to about 90.0% by total weight of the fatty acid rosin mixture of unsaturated fatty acid, and

(b) about 10.0% to about 90.0% by total weight of the fatty acid rosin mixture of rosin; and

(2) about 40.0% to about 80.0% by total weight of the reactants of a monomer mixture comprising:

(a) about 15.0% to about 45.0% by total weight of the monomer mixture of a member selected from the group consisting of acrylic acid, methacrylic acid, and combinations thereof,

(b) about 55.0% to about 85.0% by total weight of the monomer mixture of non-carboxylic acid containing vinylic monomer,

(c) about 0.5% to about 5.0% by total weight of the monomer mixture of polymerization initiator, and

(d) up to about 4.0% by total weight of the monomer mixture of chain transfer agent, at a temperature in the range of about 135° C to about 175° C to produce a rosin-fatty acid vinylic polymer having a weight average molecular weight in the range of about 4,000 to about 12,000;

(B) reacting in an "ene" or Diels-Alder adduction reaction:

(1) about 88.0% to about 99.5% by total weight of the reactants of rosin-fatty acid vinylic polymer, and

(2) about 0.5% to about 12.0% by total weight of the reactants of a member selected from the group consisting of α,β -unsaturated carboxylic acids, α,β -unsaturated carboxylic anhydrides, and combinations thereof at a temperature in

the range of about 170° C to about 240° C to produce an adducted rosin fatty acid vinylic polymer;

(C) reacting in a condensation polymerization reaction:

(1) about 65.0% to about 95.0% by total weight of the reactants of the adducted rosin fatty acid vinylic polymer, and

(2) about 5.0% to about 35.0% by total weight of the reactants of dimer acid-based polyamide resin at a temperature in the range of about 200° C to about 280° C;

to produce the rosin-fatty acid vinylic polyamide polymer resin composition.

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2. The rosin-fatty acid vinylic polyamide polymer resin composition of claim 1 comprising the reaction product prepared by:

(A) reacting in an addition polymerization reaction:

(1) about 20.0% to about 60.0% by total weight of the reactants of a fatty acid rosin mixture comprising:

(a) about 20.0% to about 50.0% by total weight of the fatty acid rosin mixture of unsaturated fatty acid, and

(b) about 50.0% to about 80.0% by total weight of the fatty acid rosin mixture of rosin; and

(2) about 40.0% to about 80.0% by total weight of the reactants of a monomer mixture comprising:

(a) about 20.0% to about 25.0% by total weight of the monomer mixture of a member selected from the group consisting of acrylic acid, methacrylic acid, and combinations thereof,

(b) about 60.0% to about 70.0% by total weight of the monomer mixture of non-carboxylic acid containing vinylic monomer,

(c) about 1.0% to about 3.0% by total weight of the monomer mixture of polymerization initiator, and

(d) about 0.5% to about 2.0% by total weight of the monomer mixture of chain transfer agent, at a temperature in the range of about 140° C to about 170° C to produce a rosin-fatty acid vinylic polymer having a weight average molecular weight in the range of about 5,000 to about 11,000;

(B) reacting in an "ene" or Diels-Alder adduction reaction:

(1) about 92.0% to about 98.0% by total weight of the reactants of rosin-fatty acid vinylic polymer, and

(2) about 2.0% to about 8.0% by total weight of the reactants of a member selected from the group consisting of α,β -unsaturated carboxylic acids, α,β -unsaturated carboxylic anhydrides, and combinations thereof at a temperature in the range of about 180° C to about 220° C to produce an adducted rosin fatty acid vinylic polymer;

(C) reacting in a condensation polymerization reaction:

- (1) about 75.0% to about 90.0% by total weight of the reactants of the adducted rosin fatty acid vinylic polymer, and
- (2) about 10.0% to about 25.0% by total weight of the reactants of dimer acid-based polyamide resin at a temperature in the range of about 220° C to about 260° C;

to produce the rosin-fatty acid vinylic polyamide polymer resin composition.

3. The resin composition of claim 1 wherein the fatty acid is a member selected from the group consisting of unsaturated fatty acids containing from 12 to 24 carbon atoms and combinations thereof.

4. The resin composition of claim 3 wherein the fatty acid is tall oil based.

5. The resin composition of claim 1 wherein the rosin is a member selected from the group consisting of tall oil rosin, wood rosin, gum rosin, and combinations thereof.

6. The resin composition of claim 1 wherein the non-carboxylic acid containing vinylic monomer is a member selected from the group consisting of styrenic monomers, acrylic monomers, methacrylic monomers, and combinations thereof.

7. The resin composition of claim 6 wherein the non-carboxylic acid containing vinylic monomer is a mixture containing at least one monoalkenyl aromatic monomer and at least one acrylic monomer.

8. The resin composition of claim 7 wherein the monoalkenyl aromatic monomer is a member selected from the group consisting of alpha-methyl styrene, styrene, vinyl toluene, tertiary butyl styrene, ortho-chlorostyrene, and combinations thereof.

9. The resin composition of claim 6 wherein the acrylic monomer is a member selected from the group consisting of methyl methacrylate, ethyl methacrylate, n-propyl methacrylate, n-butyl methacrylate, isopropyl methacrylate, isobutyl methacrylate, n-amyl methacrylate, n-hexyl methacrylate, isoamyl methacrylate, 2-hydroxyethyl methacrylate, 2-hydroxypropyl methacrylate, N,N-dimethylaminoethyl methacrylate, N,N-diethylaminoethyl methacrylate, t-butylaminoethyl methacrylate, trifluoroethyl methacrylate, glycidyl methacrylate, benzyl methacrylate, allyl methacrylate, 2-n-butoxyethyl methacrylate, 2-chloroethyl methacrylate, sec-butyl-methacrylate, tert-butyl methacrylate, 2-ethybutyl methacrylate, cinnamyl methacrylate, crotyl methacrylate, cyclohexyl methacrylate, cyclopentyl methacrylate, 2-ethoxyethyl methacrylate, furfuryl methacrylate, hexafluoroisopropyl methacrylate, methallyl methacrylate, 3-methoxybutyl methacrylate, 2-methoxybutyl methacrylate, 2-nitro-2-methylpropyl methacrylate, n-octylmethacrylate, 2-ethylhexyl methacrylate, 2-phenoxyethyl methacrylate, 2-phenylethyl methacrylate, phenyl methacrylate, propargyl methacrylate, tetrahydrofurfuryl methacrylate, tetrahydropyranyl methacrylate, methacrylonitrile, methacrylamide, N-methylmethacrylamide, N-ethylmethacrylamide, N,N-diethylmethacrylamide, N,N-dimethylmethacrylamide, N-phenyl-methacrylamide, methacrolein, methyl acrylate, ethyl acrylate, n-propyl acrylate, isopropyl acrylate, n-butyl acrylate, n-decyl acrylate, acrylonitrile, acrylamide, methyl alpha-chloroacrylate, methyl 2-cyanoacrylate, N-ethylacrylamide, N,N-diethylacrylamide, acrolein, and combinations thereof.

10. The resin composition of claim 1 wherein the polymerization initiator is a member selected from the group consisting of t-butyl peroxide, t-butyl peroxybenzoate, t-butyl peroctoate, cumene hydroperoxide, azobisisobutyronitrile, benzoyl peroxide, and combinations thereof.

11. The resin composition of claim 1 wherein the chain transfer agent is a member selected from the group consisting of dodecyl mercaptan, mercaptoacetic acid, mercaptopropionic acid, octyl mercaptan, 2-mercaptoethanol, and combinations thereof.

12. The resin composition of claim 1 wherein the α,β -unsaturated carboxylic acid is a member selected from the group consisting of maleic acid, fumaric acid, acrylic acid, methacrylic acid, itaconic acid, and combinations thereof.

13. The resin composition of claim 1 wherein the α,β -unsaturated anhydride is a member selected from the group consisting of maleic anhydride, itaconic anhydride, and combinations thereof.

14. An aqueous varnish comprising an aqueous solution of the resin composition of claim 1 and a member selected from the group consisting of organic bases, inorganic bases, and combinations thereof.

15. The aqueous varnish of claim 14 wherein the base is a member selected from the group consisting of ammonia, water-soluble amines, water-soluble alkanolamines, alkali metal hydroxides, alkali metal carbonates, and combinations thereof.

16. An ink vehicle comprising the aqueous varnish of claim 15 and a member selected from the group consisting of acrylic latices, styrenic latices, and combinations thereof.

17. An ink comprising the ink vehicle of claim 16 and an aqueous pigment dispersion.

18. An aqueous varnish comprising an aqueous solution of the resin composition of claim 2 and a member selected from the group consisting of organic bases, inorganic bases, and combinations thereof.

19. An ink vehicle comprising the aqueous varnish of claim 18 and a member selected from the group consisting of acrylic latices, styrenic latices, and combinations thereof.

20. An ink comprising the ink vehicle of claim 19 and an aqueous pigment dispersion.